

RECEIVED
CENTRAL FAX CENTERREMARKS DEC 19 2006

Enclosed is a petition for an extension of time and the appropriate fee. Applicants have cancelled Claims 4-6, 11, 18-21, 28-30, and 39-42 without prejudice or disclaimer. Applicants have amended Claims 1, 7-10, 12-15, 26-27, and 31-32, and have added new claims 44-52. No new matter is introduced by these amendments. Therefore, upon entry of this amendment, Claims 1-3, 7-10, 12-17, 22-27, 31-38, and 43 are currently pending. Reconsideration is respectfully requested based on the amendments and remarks herein.

Claims 1-2, 4-6, 11, 13, 15, 18, 25-30, 32, 34, 36, 39 and 43 were rejected under 35 U.S.C. 102(b) as being completely anticipated by U.S. Patent No. 5,377,002 to *Malin et al.* (hereinafter *Malin*).

Independent Claim 1 is amended to recite "applying an algorithm to the detector signal to quantify at least one of a temporal and a spatial change in a characteristic of the surface" and "the computer processing the characteristic signal to at least one of determine a failure precursor, perform a damage prognosis, and perform a remaining-life prognosis" which is not taught by *Malin*. Since not all of the claimed elements are taught by *Malin*, Applicants submit that *Malin* cannot anticipate the claimed invention. Claims 4-6, 11, and 18 are cancelled. Dependent claims 2, 13, 15, and 25 depend from Claim 1 and are not anticipated, at least based on this dependency. Similarly, Claim 26 is amended to recite "applying an algorithm to the detector signal to quantify at least one of a temporal and a spatial change in a characteristic of the surface" and "the processing step includes processing the characteristic signal to at least one of determine a failure precursor, determine a damage prognosis, and determine a remaining-life prognosis" which is not taught by *Malin*. Since not all of the claimed elements are taught by *Malin*,

LAW OFFICES OF
MACPHERSON KYOK CHEN &
HEID LLP
3402 MICHELSON DRIVE
SUITE 210
IRVINE CA 92612
(949) 752-7040
FAX (949) 392-9262

Applicants submit that *Malin* cannot anticipate the claimed invention. Claims 28-30 and 39 are cancelled. Dependent claims 27, 32, 34, 36, and 43 depend from Claim 26 and are not anticipated, at least based on this dependency. Therefore, Applicants request the rejection of Claims 1-2, 4-6, 11, 13, 15, 18, 25-30, 32, 34, 36, 39 and 43 under 35 U.S.C. 102(b) be withdrawn.

Claim 3 is rejected under 35 U.S.C. 103(a) as being obvious over *Malin* in view of U.S. Patent No. 5,293,216 to *Mehrdad M. Moslehi* (hereinafter *Moslehi*). As discussed in reference to Claim 1, *Malin* does not teach "applying an algorithm to the detector signal to quantify at least one of a temporal and a spatial change in a characteristic of the surface" and "the computer processing the characteristic signal to at least one of determine a failure precursor, perform a damage prognosis, and perform a remaining-life prognosis" and *Moslehi* does not remedy this deficiency.

As noted by the Examiner, only *Moslehi* makes any reference to "in situ" and Applicants respectfully assert that *Moslehi* is using the term in a manner that is contrary to what is presently claimed. Specifically, *Moselehi* teaches the phrase "in situ" means a temporary use in a manufacturing environment, and only for the purpose of providing feedback for a manufacturing process. For the convenience of the Examiner, several pertinent portions of the cited reference are reproduced below.

"The present invention generally relates to measurement of semiconductor wafer physical characteristics, and more particularly to a method and apparatus for non-invasive in-situ measurements of polycrystalline layer thickness, surface roughness, and electromagnetic emissivity on semiconductor wafers." (emphasis added, *Moslehi* col. 1 lines 13-18).

Here, *Moslehi* teaches their disclosure is drawn to non-invasive measurements on a plurality of semiconductor wafers.

LAW OFFICES OF
MACPHERSON KWOK CHEN &
BEID LLP
2403 MICHELSON DRIVE
SUITE 210
IRVINE CA 92612
(949) 752-7040
FAX (949) 392-9262

"Semiconductor device manufacturers can only discard rejected semiconductor chips, thus resulting in undesirable production process waste and increased device manufacturing costs. If it is possible, however, to closely monitor various process parameters in-situ during the process or immediately after processing each individual wafer, process parameters can be properly adjusted in order to achieve good process control and improved process parameter reproducibility." (emphasis added, *Moslehi* col. 1 lines 35-43)

Here, *Moslehi* clarifies the importance of in situ monitoring of the wafers to achieve good process control of the wafer manufacturing process.

"However, known methods of measuring layer thicknesses on semiconductor wafers mostly require physical contact with the layer. But, physical contact with a wafer in the processing reactor can be detrimental to the process or wafer and may reduce the device manufacturing yield." (emphasis added, *Moslehi* col. 1 lines 60-65)

While setting the background of their invention, *Moslehi* underscores the importance of not having physical contact with the wafer in the processing reactor. Applicants respectfully submit that *Moslehi* is concerned chiefly with non-invasive testing during manufacture, where the inspection objects are not removed from the manufacturing environment. In this manner, *Moslehi* is setting the stage for distinguishing their invention from an inspection system where the semiconductor wafers are removed from the assembly line and placed under inspection.

"The conventional fabrication environments rely on controlling a limited set of critical equipment and process parameters (e.g., process pressure, gas flow rates, substrate temperature, radio frequency plasma power, etc.); however, most of the significant wafer, process and equipment parameters of interest are not monitored in real time or in situ." (emphasis added *Moslehi* col. 5 lines 24-30)

Here, it appears *Moslehi* is expressing an alternative equivalent of "real time" to further clarify their of the phrase "in situ" to mean a temporary measurement of a manufacturing object within the manufacturing environment.

"A technical advantage of the present invention is that it provides capabilities for semiconductor device manufacturing process control. Because the method

LAW OFFICES OF
MACPHERSON KWOK CHEN &
HUI LLP
2402 MICHELSON DRIVE
SUITE 210
IRVINE CA 92612
(949) 732-7040
FAX (949) 392-9562

and sensor apparatus are non-invasive and in situ, a process control computer can make continual adjustments and process parameter optimizations during the fabrication of a large quantity of semiconductor devices based on in-situ pre- and post-process wafer measurements in batch and single-wafer processing reactors." (emphasis added, Moslehi col. 4, lines 1-9)

In this portion of their summary section, *Moslehi* clarifies their teachings and claims are drawn to manufacturing process control that necessarily includes a temporary measurement of a plurality of inspection objects during a sequence of processing operations described elsewhere in their disclosure. Applicants respectfully submit that *Moslehi* uses the phrase "in situ" to mean "in the assembly line" for a plurality of inspection objects, where the measurement device cannot be installed with respect to a singular measurement object.

In contrast to the disclosure of *Moslehi*, Claim 3 recites "the energy source and the detector section are installed in situ with respect to the object" (emphasis added) which is not taught by *Malin* or *Moselehi* in any combination. While the phrase "in situ" may be used rather loosely in the art, and as specifically described in reference to *Moslehi*, in the present application the claimed phrase "installed in situ with respect to the object" specifically differentiates from precisely the type of temporary application of inspection for a plurality of inspection objects taught by *Moslehi*. New claims are provided, as discussed below, where further aspects of the recited structure of Claim 3 may be practiced.

In addition to all of the above remarks, Claim 3 depends from the amended Claim 1 and is patentably distinguished at least based on this dependency. Therefore, Applicants request the rejection of Claim 3 under 35 U.S.C. 103(a) be withdrawn.

LAW OFFICES OF
DIACHERSON KWOK CHEN &
HEID LLP
2402 MICHELSON DRIVE
SUITE 210
IRVINE CA 92612
(949) 752-7040
FAX (949) 382-0362

Claims 7-10, 12, 14, 16-17, 22-24, 31, 33, 35, 37-38 were rejected under 35 U.S.C. 103(a) as being obvious over *Malin* in view of U.S. Patent No. 6,392,749 to *Meeks et al.* (hereinafter *Meeks*).

As discussed in reference to Claim 1, *Malin* does not teach "applying an algorithm to the detector signal to quantify at least one of a temporal and a spatial change in a characteristic of the surface" and "the computer processing the characteristic signal to at least one of determine a failure precursor, perform a damage prognosis, and perform a remaining-life prognosis" and *Meeks* does not remedy this deficiency. Claims 7-10, 12, 14, 16-17, 22-24 depend from the amended Claim 1 and are patentably distinguished at least based on this dependency. Claims 8-10 are amended to recite properties of the detector signals and correct typographical errors. Similarly, *Malin* does not teach "applying an algorithm to the detector signal to quantify at least one of a temporal and a spatial change in a characteristic of the surface" and "the processing step includes processing the characteristic signal to at least one of determine a failure precursor, determine a damage prognosis, and determine a remaining-life prognosis" and *Meeks* does not remedy this deficiency. Claims 31, 33, 35, and 37-38 depend from amended Claim 26 and are patentably distinguished at least based on this dependency. Therefore, Applicants request the rejection of Claims 7-10, 12, 14, 16-17, 22-24, 31, 33, 35, 37-38 under 35 U.S.C. 103(a) be withdrawn.

Claims 19-21 and 40-42 were rejected under 35 U.S.C. 103(a) as being obvious over *Malin* in view of the Background of the Present Invention paragraphs [0006] to [0009] of the published application, hereinafter the Background. Applicants respectfully traverse this rejection in its entirety.

LAW OFFICES OF
MACPHERSON KWOK CHEN &
HEID LLP
2402 MICHELSON DRIVE
SUITE 210
IRVING CA 92612
(415) 732-7040
FAX (408) 392-9262

Applicants respectfully submit that the Background describes problems and the need for a solution within this technology area, but the Background, alone or in combination with the cited references, does not teach the claimed apparatus or method. Instead, the Background merely provides a framework within which to understand the importance of the claimed solution to the named problems. Specifically, the Background does not teach "transmitting a source signal over time to a surface of an object for specular reflection or scattering", "applying an algorithm to the detector signal to quantify at least one of a temporal and a spatial change in a characteristic of the surface, the processor applying the algorithm to the plurality of detector signals, the processor includes a peak detector, the processor providing a characteristic signal when a condition of the peak detector is met", and "the computer processing the characteristic signal to at least one of determine a failure precursor, perform a damage prognosis, and perform a remaining-life prognosis" as in amended Claim 1. Similarly, the Background does not teach "transmitting a source signal over time to a surface of an object for specular reflection or scattering", "processing a detector signal indicative of the received signal by applying an algorithm to the detector signal to quantify at least one of a temporal and a spatial change in a characteristic of the surface", and "providing a characteristic signal when at least one detector signal meets a condition, the processing step includes processing the characteristic signal to at least one of determine a failure precursor, determine a damage prognosis, and determine a remaining-life prognosis" as claimed in amended Claim 26. Applicants submit that the names of some solutions are mentioned in the Background, but the apparatus and method employed to provide these solutions is not

LAW OFFICES OF
MACPHERSON KWOK CHEN &
HEED LLP
2403 MICHELSON DRIVE
SUITE 210
IRVINE CA 92612
(949) 752-7040
FAX (949) 592-9363

taught or suggested. In this manner, Applicants respectfully submit that the claimed structure cannot be taught by Background and the cited references in any combination.

Since Claims 19-21 are cancelled and their respective subject matter is incorporated into Claim 1, and Claims 40-42 are cancelled and their respective subject matter incorporated into Claim 26, Applicants request the rejection of Claims 19-21 and 40-42 under 35 U.S.C. 103(a) be withdrawn.

New Claims 44-52 are added and are supported by the application as filed. No new matter is introduced by these newly added claims.

New Claim 44 depends from dependent Claim 3, and further recites "the energy source and the detector section are installed to provide at least one of continuous and discrete monitoring of the object over a predetermined time period" as supported by the application as filed (Specification para. [0038] of the published application, lines 1-3). New Claim 45 depends from Claim 44 and further recites "the predetermined time period includes a span of at least a plurality of seconds to a plurality of years" as supported by the application as filed (Specification para. [0038] lines 3-4).

New Claim 46 depends from Claim 3, and further recites "the object is measured to quantify at least one of temporal changes and spatial changes in the characteristic of the surface of the object" as supported by the application as filed (Specification para. [0038] lines 4-7). New Claim 47 depends from Claim 46 and further recites "the temporal changes indicate at least one of fatigue damage and surface residual stress" as supported by the application as filed (Specification para. [0053] lines 1-2, and para. [0055] lines 1-2). New Claim 48 depends from Claim 47, and further recites "the fatigue damage is monitored throughout the component lifetime" as supported by the application

LAW OFFICES OF
MACPHERSON KYOK CHEN &
HEID LLP
2402 MICHELSON DRIVE
SUITE 210
IRVINE CA 92612
(949) 752-7040
FAX (949) 392-9262

as filed (Specification para. [0066] lines 7-9). New Claim 49 also depends from Claim 47, and further recites "fatigue damage is monitored using statistical evaluation of the surface roughness" as supported by the application as filed (Specification para. [0066] lines 7-9).

New Claim 50 depends from Claim 3, and further recites "the object includes an aircraft component disposed in an aircraft, the energy source and the detector section being installed in the aircraft" as supported by the application as filed (Specification para. [0051] lines 1-5, para. [0055] lines 1-5, and Figs. 9-10). New Claim 51 depends from Claim 50, and recites "the aircraft component is a turbine rotor" as supported by the application as filed (Specification para. [0016] lines 1-2). Finally, Claim 52 depends from Claim 50 and further recites "changes in the aircraft component are related to at least one of fatigue loading conditions, impending crack formation, and foreign object damage" as supported by the application as filed (Specification para. [0016] lines 2-3). In view of the above remarks, Applicants respectfully assert the newly added claims 44-52 are allowable over the cited references, at least based on their dependence from Claim 3.

If the Examiner has any questions or concerns, a telephone call to the undersigned at (949) 752-7040 is welcomed and encouraged.

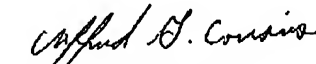
Certification of Facsimile Transmission

I hereby certify that this paper is being facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.


Monique M. Butler

December 19, 2006
Date of Signature

Respectfully submitted,


Clifford G. Cousins
Agent for Applicants
Reg. No. 50,315

LAW OFFICES OF
MACPHERSON KIVOK CHEN &
BEID LLP
2402 MICHELSON DRIVE
SUITE 210
IRVINE CA 92612
(949) 752-7040
FAX (408) 397-9262